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**B3N N7A**

(56) Documents Cited:
**DE 003832343 A1** **FR 002579127 A1**
**JP 110114849 A** **US 2706506 A**

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UK CL (Edition X ) **B3N**
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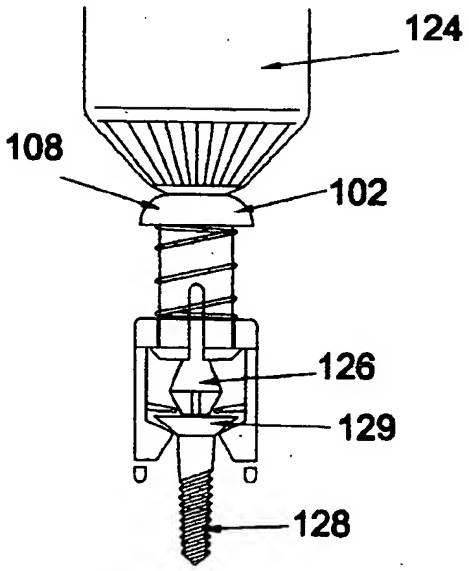
(54) Abstract Title: **Fastner retaining device**

(57) A device for retaining fasteners comprising a mounting portion 102 for mounting to a driver bit 126 and a retaining portion, the retaining portion including radially inwardly projecting retaining means to retain the head of a fastener 128, the retaining portion being biased, and being able to move away from a workpiece to allow the fastener to be driven into the workpiece. Preferably the retaining portion is biased by a spring (4, fig.4a), which can move the retaining portion forward again when it is moved away from a workpiece. The retaining means may be prongs (114, fig.5a) formed from a cut-out portion of a sleeve. The mounting portion may comprise a tubular member (106, fig.5a) onto which the retaining portion is slidably mounted. Preferably, abutment means (140, fig.5) are provided to the rear of the retaining means to hold the head of a fastener between the abutment means and the retaining means.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

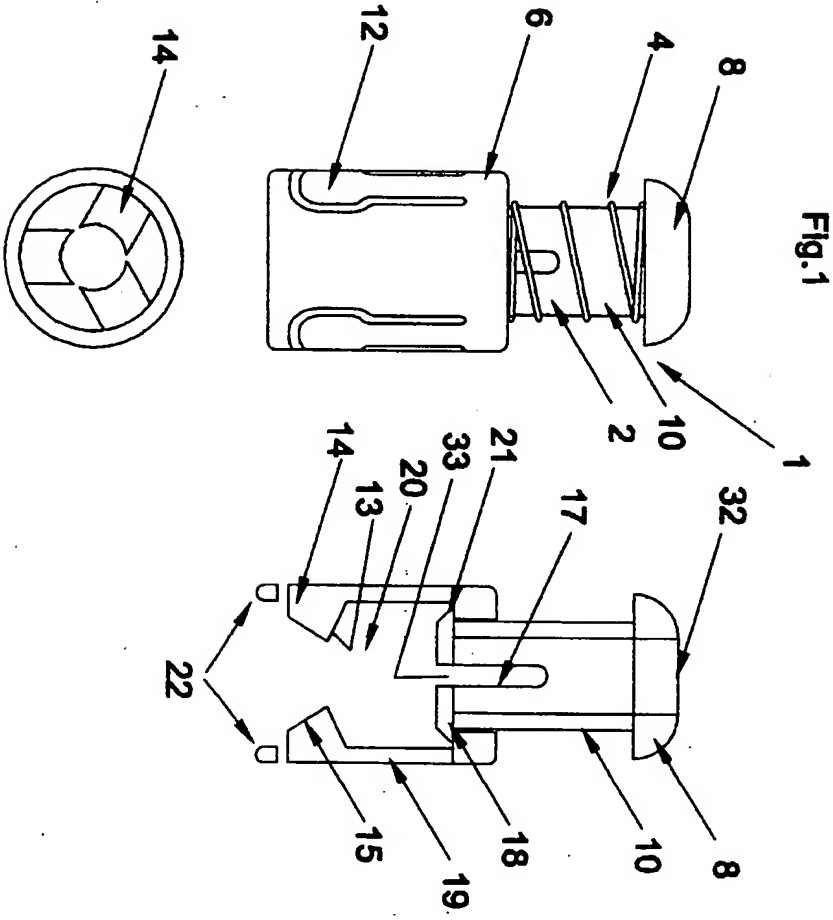


Fig.1a

Fig.1




Fig.2

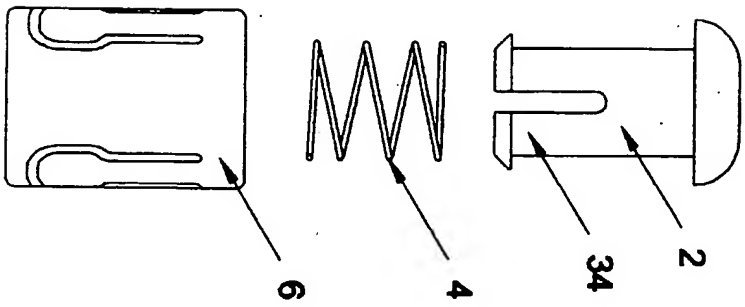


Fig.3

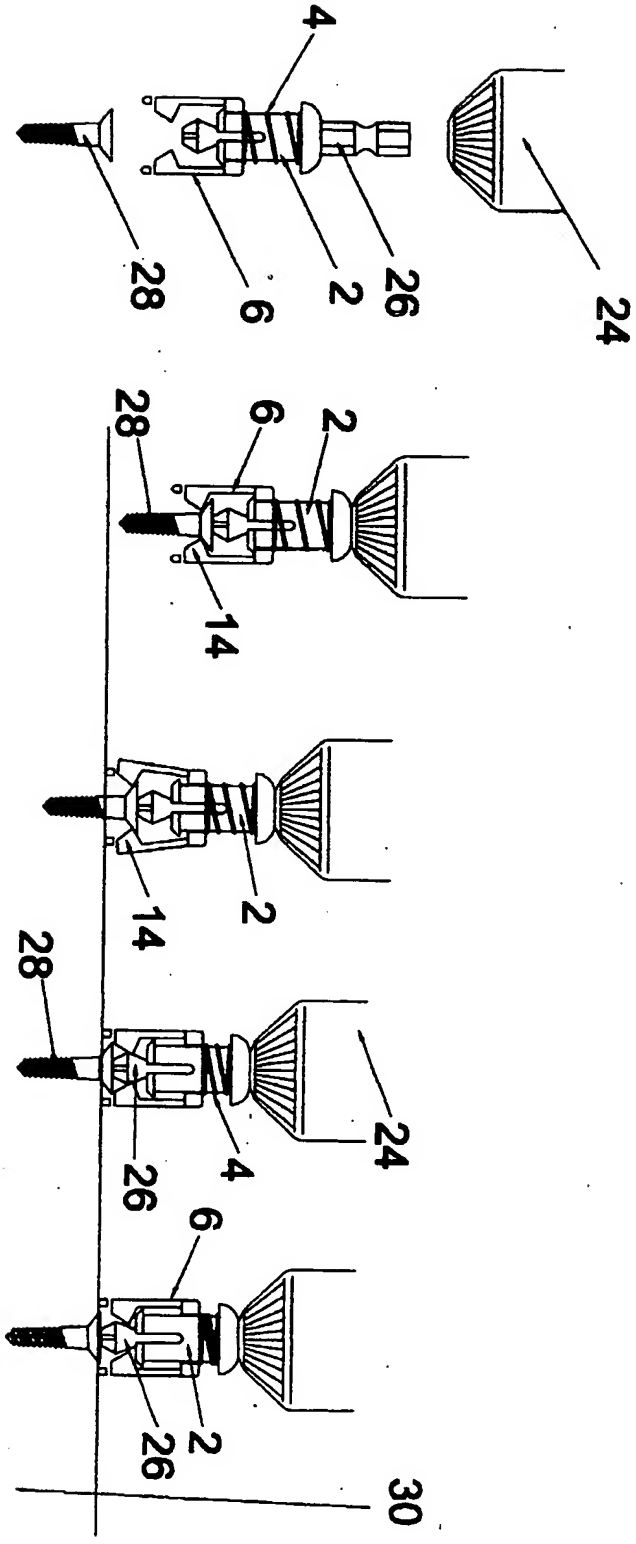


Fig.4a

Fig.4b

Fig.4c

Fig.4d

Fig.4e

Fig.5

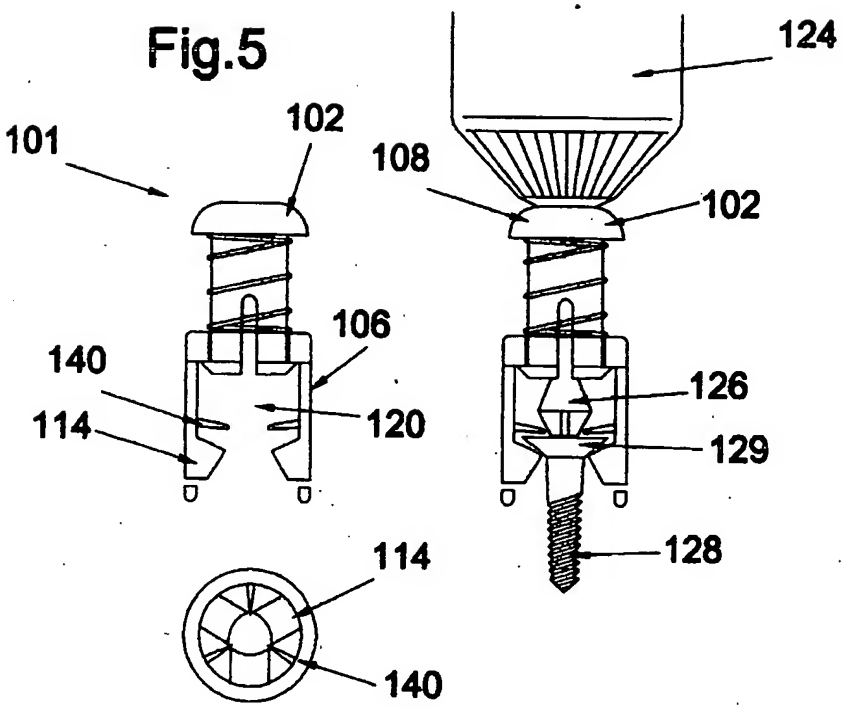


Fig.5a

# Fastener Retaining Device

The present invention refers to a device for retaining a fastener in position on a driver bit ready to be driven into a work piece. In particular, but not exclusively, it relates to a device for retaining a screw in contact with a driver bit of a power tool.

It is known in the art for screwdrivers to have a magnetised driving bit to hold a metal screw in contact with the driving bit. These screwdrivers have the disadvantage that the screwdriver cannot be used with non-metal screws. Another disadvantage is that the screw can become magnetised itself, which could be damaging in certain circumstances. A still further disadvantage is that the screw can slip and be held at an angle to the material to be worked, or even held against a side surface of the driving bit.

GB 2324261 discloses a gripping accessory for retaining a screw in position at the end of a screwdriver. Once the screw has been screwed into a material, the gripping accessory is forcibly pulled away from the material in order to release the screw from the material. This accessory has the disadvantage that pulling the accessory away from the material requires a degree of force from the user, and pulling the accessory away from the material can also pull the screw out of the material.

US 6082233 discloses a fastener holding device where an outer sleeve can be manually pulled back to load a fastener into the fastener holding device. In use, the outer sleeve contacts the work piece, which in some embodiments causes retainers to open, allowing the fastener to leave the device. In other embodiments clamps disengage the screw as it is driven into the work piece. This fastener holding device has the disadvantage that a number of manual operations are necessary to load the fastener

holding device with a fastener and it is therefore complicated and slow to use. A further disadvantage of this device is that it is complicated and expensive to produce because it comprises a large number of parts.

According to a first aspect, the invention provides a fastener retaining device comprising a mounting portion arranged to be mounted on a driver bit, and a retaining portion, the retaining portion including a radially inwardly projecting retaining means, arranged, in use, to retain the head of a fastener and to be capable of being pushed apart to allow the head of the fastener to pass the retaining means, the retaining portion being biased in a forward direction, so that the retaining means can be positioned beyond the end of the driver bit to retain the fastener for engagement by an end of the bit, and moveable back when it contacts a work piece to allow the fastener head to move past the retaining means as the fastener is driven into the work piece.

The biasing means is preferably arranged to move the retaining portion forward again when it is moved away from the work piece.

Preferably, the retaining means comprises one or more prongs longitudinally extending along the retaining portion having a radially inwardly projecting protrusion at one end. The prongs may be formed as a cut-out portion of a sleeve member of the device, which may form the retaining portion.

Preferably, the at least one radially inwardly projecting protrusion has an angled surface that allows the retaining means to be pushed outwards as the head of the fastener moves into a retained position in the device. It may further have a second angled surface to allow the retaining means to be pushed outwards by the fastener head to allow the fastener to be driven into the workpiece.

Preferably, the retaining portion is slidably mounted on the mounting portion, which may comprise a tubular support member. This enables the retaining means to move relative to the driver bit when the device contacts the work piece.

Preferably, the retaining portion is biased in a forward direction by a spring, which may comprise a compression spring. Stop means may also be provided, arranged to ensure that, at rest, the sleeve member is positioned relative to the tubular support so that the retaining means is positioned beyond the end of a driver bit located in the tubular support.

Preferably, the fastener retaining device may be arranged to be loaded with a fastener by forcing the enlarged head portion of the fastener past the retaining means. This has the advantage that it is easy to load the fastener retaining device with fasteners without any complex operations.

The retaining means may have at least one abutment means to the rear of the retaining means to hold the head of the fastener between the abutment means and the retaining means.

The fastener retaining device may be arranged to be used with a number of different sized fasteners.

According to a second aspect, the invention provides a driver bit with a fastener retaining device according to the first aspect of the invention attached to it.

Preferably, the driver bit is releasably attached to the fastener retaining device. The releasable attachment may be a friction fit between the

driver bit and the fastener retaining device. Alternatively, the fastener retaining device may be permanently attached to the driver bit.

The driver bit may be attached to a power tool. Alternatively, the driver bit is part of a hand driven screwdriver.

There are now described, by way of example only, embodiments of the present invention with reference to the accompanying figures, of which:

**Figure 1** shows a side view of a fastener retaining device according to an embodiment of the present invention;

**Figure 1a** shows an end view of the device of Figure 1;

**Figure 2** shows the fastener retaining device of Figure 1 in cross-section;

**Figure 3** shows an exploded view of the components of the fastener retaining device of Figure 1;

**Figures 4A to 4E** show the fastener retaining device of Figure 1 in use with a fastener and a driver;

**Figure 5** shows a side view of a fastener retaining device according to another embodiment of the present invention;

**Figure 5a** shows an end view of the device of Figure 5;

**Figure 6** shows the fastener retaining device of Figure 5 in use with a fastener and a drill.

Referring to Figures 1 to 3 a fastener retaining device according to an embodiment of the present invention comprises a tubular support or mounting portion, which in this embodiment is a plunger 2, a compression spring 4 and a sleeve member having retaining means, which in this embodiment is a barrel 6 with radially inwardly projecting protrusions 14.

The plunger 2 comprises a hollow tubular shank 10 with openings 32, 33 at each end of the plunger 2. Three slots 17 extend from one end of the shank 10 about half way along the shank 10, dividing the bottom end of the shank 10 into four legs 34. The plunger 2 has an outwardly extending lip 18 at the bottom end of each leg 34. At the top end of the shank 10 is a head 8, which projects radially outwards to provide a surface against which the compression spring 4 can act.

The barrel 6 comprises a hollow cylinder 19 having an opening at each end. An inwardly projecting shoulder 21 at the top or rear end of the barrel 6 defines a circular top opening. The opening 22 at the bottom end of the barrel 6 opens into a cavity 20 within the barrel 6.

Cut outs in the barrel 6 define three prongs 12 that extend longitudinally along a portion of the barrel 6. Each prong 12 is joined to the main part of the barrel 6 at its top end and is free to flex radially inwardly/outwardly at its bottom or forward end. Each prong 12 terminates at its bottom end with a radially inwardly extending protrusion 14 projecting into the cavity 20 of the barrel 6. The inwardly extending protrusions 14 have a top surface 13 and a bottom surface 15. The top surface 13 slopes down towards the centre of the barrel 6, and the bottom surface 15 slopes up towards the centre of the barrel 6.

The plunger 2 is arranged to be slidably coupled at least partially within the barrel 6. The three slots 17 in the shank 10 of the plunger 2 enable the four legs 34 at the bottom of the shank 10 to be flexed inwards when the plunger 2 is first inserted into the top of the barrel 6. Once the plunger 2 has been positioned within the barrel 6, the four legs 34 at the bottom of the shank 10 return to their original position and the plunger 2 has been secured to the barrel 6. The lip 18 at the bottom of each leg 34 of the shank 10 abuts the shoulder 21 at the top end of the barrel 6 when the device is at rest to ensure that the plunger 2 and the barrel 6 are not separated in use. The compression spring 4 is located around the part of the shank 10 of the plunger 2 that is not within the barrel 6, and is arranged to bias the retaining barrel 6 forwards relative to the plunger 2 to a retaining position ready for use of the fastener retaining device 1 as shown in Figure 1.

The barrel 6 in this example has three prongs 12, although it will be appreciated that the barrel 6 can have any number of prongs 12 that will enable a fastener to be retained in the fastener retaining device 1. The barrel can have two, four, five, or any other suitable number of prongs 12.

Referring to Figure 4A to use the fastener retaining device 1 the driver bit 26 is frictionally secured within the shank 10 of the plunger 2 of the fastener retaining device 1, such that the end of the driver bit 26 is located within the cavity 20 of the barrel 6. The driver bit 26 is correctly positioned within the fastener retaining device 1 before the driver bit 26 is inserted into the drill chuck 24.

When the fastener retaining device 1 is at rest, the effective size of the opening 22, at the radially innermost points of the inwardly extending protrusions 14, is smaller than the diameter of the head of a screw 28 that

is to be used with the fastener retaining device 1. The prongs 12 are flexible enough to enable the protrusions 14 to be pushed outwards and enlarge the opening 22. As a screw head is pushed through the opening 22 and into the cavity 20 of the barrel 6, the head of the screw contacts the bottom surface 15 of the protrusions 14. As the screw head continues to move into the cavity of the barrel 6, the angled bottom surface 15 of the protrusions causes the prongs 12 to flex outwards, which causes the diameter of the opening 22 to increase. The prongs 12 return to their original position once the head of the screw has completely passed the protrusions 14, the prongs 12 snap back towards their original position to contact the underside of the screw head and the screw 28 is retained in the fastener retaining device. The opening 22 has returned to its original size. A driver bit 26 is then passed through the shank 10 of the plunger 2 and into contact with the fastener 28 located within the cavity 20 of the barrel 6. The screw is thereby held in position, with the top of its head in contact with the driver bit 26, and the underside of its head in contact with the upper surfaces 13 of the protrusions 14.

Referring to Figure 4B the driver bit 26 is then inserted into the drill chuck 24 in order that rotational motion can be imparted on the fastener retaining device and driver bit arrangement. The bit 26 is inserted into the chuck 24 until the head 8 of the plunger 2 rests against the chuck 24. The plunger head therefore acts as a stop to locate the bit 26 and retaining device 1 in the correct position longitudinally relative to the chuck. The arrangement is now ready to start rotating the screw 28 into the workpiece 30.

Referring to Figure 4C the screw 28 is brought into contact with the workpiece and rotated so that it moves further into the workpiece 30. As the plunger 2 and screw 28 continue to move forwards, the barrel 6 moves forwards also until its front end contact the workpiece. Then as

the screw 28 and plunger 2 move further forwards the barrel 6 stays still. This causes the barrel 6 to move rearwards relative to the plunger 2, compressing the spring 4. The head of the screw 28 moves forwards past the upper angled surfaces 13 of the protrusions 14. As the screw head applies a force to the upper surface 13 of the protrusions 14, the angled surface 13 will cause the prongs 12 to flex outwards and enlarge the effective size of the opening 22.

Referring to Figure 4D after the opening 22 has been made large enough to enable the screw head to completely pass by the protrusions 14, the prongs 12 move back together into their original position as the screw head continues to move forwards. The screw 28 is then no longer retained within the cavity 20 of the barrel 6 of the fastener retaining device 1. The arrangement may then be removed from the screw 28 and workpiece 30 by simply moving the drill arrangement away from the workpiece 30. This can be useful if it is desired for the screw 28 not to be flush with the surface of the workpiece 30.

Referring to Figure 4E the screw 28 may be completely screwed into the workpiece 30, so that the head of the screw 28 is flush with the surface of the workpiece 30. The drill arrangement can then be moved away from the workpiece 30, as the screw 28 has released itself from the fastener retaining device 1. Once the fastener retaining device 1 has been removed from the workpiece 30, the spring 28 biases the barrel 6 back to its starting position, and the fastener retaining device 1 is ready to receive another screw for re-use. As the position of the drill bit 26 and retaining device 1 have been set up for use with the first screw, each subsequent screw can simply be pushed between the protrusions 14 into contact with the bit 26, ready to be screwed into the workpiece.

Figures 5 and 5a shows a fastener retaining device 101 according to another embodiment of the present invention. Components that are common to the fastener retaining device 1 of Figure 1 are given similar reference numbers in the 100 series. This embodiment of the present invention has three flexible barbs 140 that extend into the cavity 120 of the barrel 106 above the protrusions 114 at the lower end of the prongs. The barbs 140 are arranged to provide a gap between the protrusions 114 and the barbs 140 that will accommodate the head of a fastener in use. This embodiment has the advantage that it is easy to align the driver bit 126 with the head of a fastener.

Referring to Figure 6, to prepare the fastener retaining device 101 for use, a screw 128 is pushed past the protrusions 114 as described above with reference to Figure 1. In this embodiment, once the head 129 of the screw 128 has completely passed the protrusions 114 it will abut the barbs 140. The head 129 of the screw 128 is firmly held between the barbs 140 and an upper surface of the protrusions 114. A driver bit 126 can then be inserted into the shank of the plunger 102 until the end of the driver bit 126 is in contact with the head 129 of the screw 128. The driver bit 126 is frictionally held within the shank of the plunger 102 in the correct position. The combined fastener retaining device 101 and driver bit 126 assembly is then inserted into the chuck of drill 124 until the head 108 of the plunger 102 abuts the drill chuck 124, and the arrangement is ready for use. Once the initial screw 128 has been deposited by the method illustrated in Figure 4, the fastener retaining device 101 can be reloaded with another screw without dismantling the combined assembly, as the driver bit 126 is still in the correct position for contacting the head of subsequent screws.

As the barbs 140 and the protrusions 114 retain the fastener 128 it is not necessary for the fastener head 129 to be held against the driver bit. This

means that different sized fasteners can be used without adjusting the device, and the initial set up is not so critical.

In this embodiment the barbs are on an inner surface of the barrel that does not form part of prongs. In an alternative embodiment the barbs may be positioned just above the protrusions on the prongs.

The barrel 6 in this example has three barbs 140, although it will be appreciated that the barrel 6 can have any number of barbs 140 that will enable a fastener to be retained in the fastener retaining device 1. Alternatively, the barbs could be replaced by a single flexible ring.

## CLAIMS

1. A fastener retaining device comprising a mounting portion arranged to be mounted on a driver bit, and a retaining portion, the retaining portion including a radially inwardly projecting retaining means, arranged, in use, to retain the head of a fastener and to be capable of being pushed apart to allow the head of the fastener to pass the retaining means, the retaining portion being biased in a forward direction, so that the retaining means can be positioned beyond the end of the driver bit to retain the fastener for engagement by an end of the bit, and moveable back when it contacts a work piece to allow the fastener head to move past the retaining means as the fastener is driven into the work piece.

2. A fastener retaining device according to claim 1, wherein the biasing means is arranged to move the retaining portion forward again when it is moved away from the work piece.

3. A fastener retaining device according to claim 2, wherein the retaining portion is biased in a forward direction by a spring.

4. A fastener retaining device according to any of claims 1 to 3, wherein the retaining means comprises one or more prongs longitudinally extending along the retaining portion having a radially inwardly projecting protrusion at one end.

5. A fastener retaining device according to claim 4, wherein the prongs are formed as a cut-out portion of a sleeve member of the device.

6. A fastener retaining device according to claim 4 or claim 5, wherein the at least one radially inwardly projecting protrusion has an

angled surface that allows the retaining means to be pushed outwards as the head of the fastener moves into a retained position in the device.

7. A fastener retaining device according to claim 6, wherein the at least one radially inwardly projecting protrusion further comprises a second angled surface to allow the retaining means to be pushed outwards by the fastener head to allow the fastener to be driven into the work piece.

8. A fastener retaining device according to any preceding claim, wherein the retaining portion is slidably mounted on the mounting portion.

9. A fastener retaining device according to any preceding claim, wherein the mounting portion comprises a tubular support member.

10. A fastener retaining device according to claim 9 when dependent on claim 5, further comprising stop means, arranged to ensure that, at rest, the sleeve member is positioned relative to the tubular support so that the retaining means is positioned beyond the end of a driver bit located in the tubular support.

11. A fastener retaining device according to any preceding claim wherein the device is arranged to be loaded with a fastener by forcing an enlarged head portion of the fastener past the retaining means.

12. A fastener retaining device according to any preceding claim, further comprising at least one abutment means to the rear of the retaining means to hold the head of a fastener between the abutment means and the retaining means.

13. A driver bit attached to a fastener retaining device, the fastener retaining device comprising a mounting portion arranged to be mounted on a driver bit, and a retaining portion, the retaining portion including a radially inwardly projecting retaining means, arranged, in use, to retain the head of a fastener and to be capable of being pushed apart to allow the head of the fastener to pass the retaining means, the retaining portion being biased in a forward direction, so that the retaining means can be positioned beyond the end of the driver bit to retain the fastener for engagement by an end of the bit, and moveable back when it contacts a work piece to allow the fastener head to move past the retaining means as the fastener is driven into the work piece.

14. A driver bit according to claim 13, wherein the driver bit is releasably attached to the fastener retaining device.

15. A driver bit according to claim 13, wherein the driver bit is permanently attached to the fastener retaining device.

16. A driver bit according to any of claims 13 to 15, wherein the driver bit is attached to a power tool.

17. A driver bit according to any of claims 13 to 15, wherein the driver bit is part of a hand driven screwdriver.

18. A fastener retaining device, substantially as hereinbefore described, with reference to any one or more of the accompanying drawings.

19. A driver bit substantially as hereinbefore described with reference to Figures 4A to 4E and Figure 6 of the accompanying drawings.

**Application No:** GB0404317.0 **Examiner:** Miss Carrie-Ann Elias

**Claims searched:** 1-19 **Date of search:** 9 March 2005

## Patents Act 1977: Search Report under Section 17

**Documents considered to be relevant:**

| Category | Relevant to claims | Identity of document and passage or figure of particular relevance |
|---|---|---|
| X | 1-4, 6-17 | JP 11114849 A (MORIMOTO) see WPI abstract accession no. 99-322000/27 and figures |
| X | 1-4, 6,8,9,11,13-17 | DE 3832343 A1 (CURTO) see WPI abstract accession no. 90-100181/37 and figure |
| X | 1-4,9,11,13-17 | FR 2579127 A1 (TRABOUILLET) see WPI abstract accession no. 86-293324/45 |
| X | 1-4, 8,9,11,13-17 | US 2706506 A (WAGNER) see column 1 line 61 - column 3 line 36 and figures |

Categories:

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|---|---|---|---|
| X | Document indicating lack of novelty or inventive step | A | Document indicating technological background and/or state of the art. |
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**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

B3N

Worldwide search of patent documents classified in the following areas of the IPC[07]

B25B

The following online and other databases have been used in the preparation of this search report

Online: WPI, EPODOC